

PATENT SPECIFICATION

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 (72) Inventors VIKTOR IVANOVICH SHAROVATOV,
 VIKTOR FEDOROVICH SAZONOV and
 ALEXANDR ANDREEVICH OSTROUKHOV



(54) APPARATUS FOR INSERTING WINDINGS IN SLOTS OF ELECTRICAL MACHINES

(71) We, NAUCHNO-ISSLEDOVATELSKY I EXPERIMENTALNY INSTITUT ELEKTROOBORUNDOVANIA I AVTOPRIBOROV, of ulitsa Kirpichnaya 39/41, Moscow, USSR, a corporate body of the USSR, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a device for inserting an assembly of winding sections in the winding slots of a magnetic circuit of an electrical machine and can be employed for manufacturing stators and rotors of electrical machines.

It is an object of this invention to improve the quality of products and thus avoid rejects.

According to the present invention there is provided an apparatus for carrying and positioning an assembly of winding sections in the winding slots of a magnetic circuit of an electrical machine, comprising a drum for supporting winding sections, together constituting a winding assembly, and installed on a turn-table, a device for supporting a magnetic circuit, and a transfer head arranged to remove the winding assembly from the supporting drum and to insert the winding sections of the assembly in the respective winding slots of the magnetic circuit, the transfer head comprises a casing with an internal annular groove surrounding a sleeve with radial slots of which the number is equal to the number of winding sections in the assembly, the sleeve being coaxially arranged within the casing, the casing and the sleeve being connected to a driving mechanism ensuring their mutual longitudinal motion, a cranked lever being pivoted in each radial slot of the sleeve, one arm of each lever being wedge-shaped and fitting inside the respective slot, while the other arm of the lever fits into the annular groove of the casing.

It is advisable that the supporting drum,

the device for mounting the magnetic circuit and the head be arranged so that their longitudinal axes are vertical.

The use of the invention ensures high quality of products and reduction of rejects through employment of head levers provided with wedge like arms, which improves the orientation and fastening of sections in the head, as well as through the vertical position of longitudinal axes of the supporting drum, the device for mounting the magnetic circuit and the head.

Other features and advantages of the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings, wherein:

Figure 1 shows a general plan view of a device according to the invention for carrying and placing a winding section assembly in the winding slots of a magnetic circuit of an electrical machine;

Figure 2 shows a section view of the head of the aforementioned apparatus;

Figure 3 shows a general view of the apparatus, when the head is positioned over the device for mounting the magnetic circuit.

The illustrated embodiment of apparatus for inserting a winding section assembly in the slots of the magnetic circuit of an electrical machine comprises a supporting drum 1 (Figure 1), a device 3 for mounting a magnetic circuit 4, said device being placed on a base 2, a transfer head 5 with a drive 6 for carrying a winding section assembly in an oriented position from the supporting drum 1 and placing the assembly in the slots of the magnetic circuit 4. The drum 1 is installed on a turntable 7.

The transfer head 5 (Figure 2) comprises a hollow, cylindrical casing 8 with an annular internal groove 9 and a sleeve 10 provided with radial slots 11 which is mounted coaxially within the casing. The number of radial slots 11 of the sleeve 10 corresponds to the number of winding sections in the assembly. Cranked levers 12

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are hinged in said radial slots 11 of the sleeve 10, one arm 13 of each lever 12 is wedge shaped and the other arm 14 of the lever 12 is engaged in the annular groove 9 of the casing 8. The drive 6 comprises a lower hydraulic cylinder 15 and an upper hydraulic cylinder 17 (Figure 3), the two cylinders having a common rod 16. The casing 8 is attached to the lower cylinder 15 and the sleeve 10 is secured to the rod 16. The upper hydraulic cylinder 17 (Figure 3) is connected by a plate 18 to extend parallel to a shaft 19 which is mounted on bearings 20 in a bracket 21 resting on the base 2. The bearing 20 is covered by a lid 22. The bracket 21 is rigidly connected to a plate 23 carrying a hydraulic cylinder 24 with a lever 25 which is connected to a bush 26 fitted on the shaft 19. The device 3 for mounting the magnetic circuit 4 is connected to a support 27 carrying a limit switch 28 for blocking the apparatus when the magnetic circuit 4 is not in the device 3. The device 3 is provided with a latch 29 to fix the magnetic circuit 4.

The apparatus operates as follows. In the initial position the head 5 (Figure 1) is placed above the supporting drum 1, on which a winding assembly is formed from winding sections. The upper cylinder 17 is energized. In this case the rod 16 (Figure 2) descends with the head 5 and the sleeve 10 envelops the winding assembly. The levers 12 are aligned with the gaps between the winding sections. The cylinder 15 is now energized and rises, thus lifting the casing 8 secured thereto. The casing 8 acts on the arms 14 of the levers 12 positioned in the annular groove 9. The levers 12 turn and their wedge arms 13 fit into the gaps between the winding sections. The sections are gripped by the levers 12, strictly oriented and tightly secured in the transfer head 5. After that the rod 16 is raised by appropriate energization of cylinder 17.

The transfer head 5 (Figure 1) is moved upwards along with the oriented winding assembly. The rod of the cylinder 24 acts on the lever 25 secured on the bush 26. The transfer apparatus, comprising the plate 18 together with the cylinder 17 attached thereto and the head 5 supported thereby, turns around the shaft 19 in the direction towards the device 3. The magnetic circuit 4 is located in the device 3 (Figure 3) in an oriented position with respect to the latch 29. After turning of the transfer assembly, the rod 16 together with the head 5 and the section assembly is lowered. The limbs of the winding sections are thus inserted into the slots of the magnetic circuit 4. The cylinder 15 is actuated so that its body is lowered. The body of the cylinder 15 (Figure 2) is brought down together with the casing 8, the groove in which acts on the arms 14 of the levers 12. The wedge arms 13 of the levers 12 are brought out of the gaps between sections and sink into the slots 11 of the sleeve 10. Then the head 5 rises and returns to its initial position. When the magnetic circuit 4 is not in the device 3 the limit switch 28 disconnects an electrical circuit and disables the apparatus so as to prevent incorrect operation. The drive 6 may be hydraulic, pneumatic or electro-mechanical.

WHAT WE CLAIM IS:—

1. An apparatus for inserting an assembly of winding sections in the winding slots of a magnetic circuit of an electrical machine, comprising a drum for supporting winding sections, together constituting a winding assembly, and installed on a turntable, a device for mounting a magnetic circuit, and a transfer head arranged to remove the winding assembly from the supporting drum and to insert the winding sections of the assembly in the respective winding slots of the magnetic circuit, the transfer head comprises a casing with an internal annular groove surrounding a sleeve with radial slots, of which the number is equal to the number of winding sections in the assembly, the sleeve being coaxially arranged within the casing, the casing and the sleeve being connected to a driving mechanism ensuring their mutual longitudinal motion, a cranked lever being pivoted in each radial slot of the sleeve, one arm of each lever being wedge-shaped and fitting inside the respective slot, while the other arm of the lever fits into the annular groove of the casing.
2. An apparatus in accordance with claim 1, wherein the supporting drum, the device for mounting the magnetic circuit and the transfer head are arranged so that their longitudinal axes are vertical.
3. An apparatus for carrying and positioning an assembly of winding sections in the slots of a magnetic circuit of an electrical machine in accordance with claim 1 or 2 and substantially as described with reference to the accompanying drawings.

A. A. THORNTON & CO.,
Chartered Patent Agents,
Northumberland House,
303/306 High Holborn,
London, WC1V 7LE.

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COMPLETE SPECIFICATION

2 SHEETS

*This drawing is a reproduction of
the Original on a reduced scale*

Sheet 1

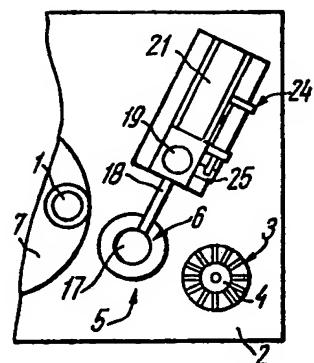


FIG. 1

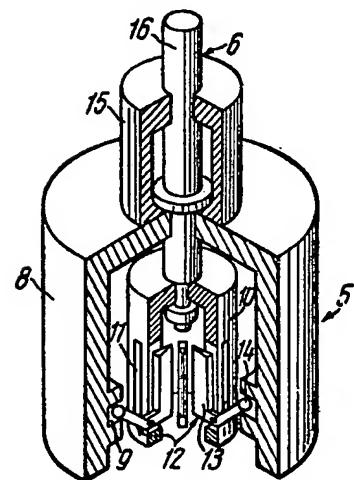


FIG. 2

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Sheet 2

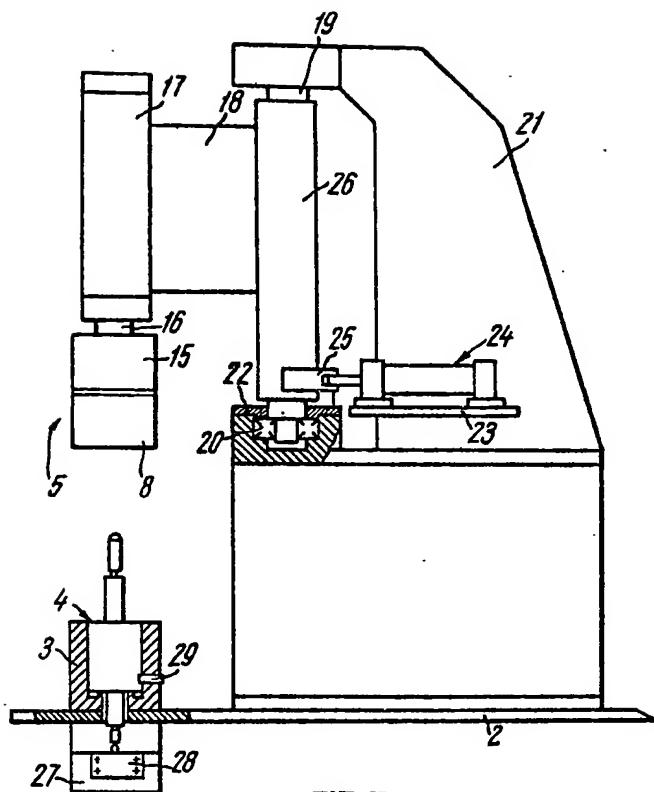


FIG. 3